

NON-PUBLIC?: N
ACCESSION #: 9008160188
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Limerick Generating Station, Unit 2 PAGE: 1 OF 4

DOCKET NUMBER: 05000353

TITLE: Reactor SCRAM resulting from a Main Turbine Trip on low Main Condenser Vacuum caused by air in-leakage from a failed drain pipe.

EVENT DATE: 07/15/90 LER #: 90-012-00 REPORT DATE: 08/14/90

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 065

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENT
OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: Gil J. Madsen, Regulatory Engineer TELEPHONE: (215) 327-1200

COMPONENT FAILURE DESCRIPTION:

CAUSE: SYSTEM: COMPONENT: MANUFACTURER:

REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On July 15, 1990, a Unit 2 Reactor SCRAM occurred following a Main Turbine Stop Valve (TSV) closure, a Reactor Protection System (RPS) actuation. The TSV closure resulted from a loss of Main Condenser vacuum due to a failed low pressure turbine bearing cavity waste oil drain pipe.

Reactor Pressure Vessel (RPV) pressure increased to 1005 psig and level decreased from a normal operating level of +35 inches to +6 inches instrument level. Primary Containment and Reactor Vessel Isolation Control System (PCRVICES), an Engineered Safety Feature (ESF), actuation signals were received and no valve motion occurred, as expected, due to plant conditions. Operators restored RPV pressure and level to normal post SCRAM operating levels. An "Unusual Event" emergency classification was declared and all appropriate notifications were made in accordance with 10CFR50.72(a)(3) and 10CFR50.72(b)(2)(ii). The pipe failure was

determined to be caused by insufficient pipe support resulting in vibration induced metal fatigue. The failed pipe was replaced and the remaining five similar pipes were inspected. Pipe supports were added to all six low pressure turbine bearing cavity waste oil drain pipes. Nuclear Engineering and Services Department personnel are evaluating the need for further corrective actions on Unit 2 and any similar actions on Unit 1. This event is being reported in accordance with 10CFR50.73(a)(2)(iv) as an automatic actuation of the RPS and an ESF actuation.

END OF ABSTRACT

TEXT PAGE 2 OF 4

Unit Conditions Prior to the Event:

Unit 1 Unit 2

Operating Condition 1 (Power Operation) 1 (Power Operation)

Power Level: 100% 65%

Description of the Event:

On July 15, 1990, at 0931 hours, a Unit 2 Reactor SCRAM occurred resulting from a Main Turbine Stop Valve (TSV, EIIS:PCV) closure, a Reactor Protection System (RPS, EIIS:JD) actuation. This RPS actuation was caused by a low condenser vacuum Main Turbine trip. All control rods (EIIS:AA) fully inserted as designed.

Prior to the SCRAM, at 0919 hours, the Main Control Room (MCR) operators observed annunciators which indicated a decrease in the Main Condenser vacuum from 27.5 in. Hg vacuum to 25.0 in. Hg vacuum. Operational Transient (OT) Procedure OT-116, "Loss of Condenser Vacuum," was implemented by MCR operators to attempt to stabilize and determine the cause of the decrease in vacuum. Reactor power, initially at 80% of rated thermal, was reduced to 65% using OT-116 and the reactor shutdown maneuvering instructions. The decrease in vacuum could not be stabilized and therefore General Plant (GP) procedure GP-4, "Rapid Plant Shutdown," was initiated. At 0931 hours, the main turbine tripped at 23.3 inches Hg vacuum indicated resulting in the reactor SCRAM. Following the main turbine trip and reactor SCRAM, Reactor Pressure Vessel (RPV, EIIS:RPV) pressure reached 1005 psig and level decreased from the normal operating level of +35 inches to +6 inches instrument level (167 inches above the top of active fuel) as an expected result of the transient. Before the main turbine trip, MCR operators manually transferred station auxiliary power from the main generator output to the offsite power source as directed by GP-4 avoiding a trip of the Reactor Recirculation Pumps

(EHS:AD). MCR operators restored RPV pressure and level to their normal post SCRAM operating levels by 0941 hours using the turbine bypass valves to control pressure and the Feedwater Level Control System (FLCS, EHS:JK) to control level.

The expected actuation signals occurred from the Primary Containment and Reactor Vessel Isolation Control System (PCRIVICS), an Engineered Safety Feature (ESF). Isolation signals in groups IIA (Shutdown Cooling) and IIB (Residual Heat Removal (RHR) Heat Exchanger, Sample Lines and RHR Drain to Radwaste Lines) were received when RPV level went below +12.5 inches instrument level (Level 3) but, because of the operating condition of the plant, all associated valves were already closed.

TEXT PAGE 3 OF 4

At 1000 hours on July 15, 1990, an "Unusual Event" emergency classification was declared in accordance with Emergency Plan (EP) procedures EP-100, "Emergency, Director Response," and EP-101, "Classification of Emergencies," due to an unusual shutdown. Notification was made in accordance with 10CFR50.72(a)(3) at 1000 hours due to the declaration of an emergency classification. At 1015 hours the Unusual Event was terminated. At 1150 hours on July 15, 1990, a four-hour notification was completed in accordance with 10CFR50.72(b)(2)(ii) to report the automatic actuation of the RPS and the ESF. This LER is being submitted in accordance with the requirements of 10CFR50.73(a)(2)(iv).

Consequences of the Event:

There were no adverse consequences as a result of this event. There was no release of radioactive material as a result of this event. The Turbine Stop Valve (TSV) closure caused a reactor SCRAM as designed and all control rods fully inserted. MCR operators responded quickly to the turbine trip and SCRAM and the MCR operators restored RPV pressure and level to their normal operating levels within 10 minutes.

The main turbine tripped at an indicated 23.3 in. Hg. of vacuum; higher than the 22.2 in. Hg vacuum setpoint. Subsequent investigation by Instrumentation and Controls (I&C) personnel revealed that the trip setpoints were correct within the instruments' tolerances. We believe that the trip occurred at the proper vacuum level. The dynamic process involved in the event, the location of the leak (the low pressure condenser), and the different trip and indication instrumentation locations all combined to result in a condition where indication of main condenser vacuum lagged behind the turbine trip instrumentation.

The following automatic RPS actuation signals also occurred that would have actuated a SCRAM if the TSV closure signal had failed:

- o Turbine Control Valve fast closure
- o Reactor water level < +12.5 inches

Cause of the Event:

The cause of this event was unexpected equipment failure. One of the six low pressure turbine bearing cavity waste oil drain pipes which pass through the Main Condenser failed resulting in a Main Condenser vacuum leak. The cause of

TEXT PAGE 4 OF 4

the pipe failure has been determined to be insufficient pipe support resulting in vibration induced metal fatigue.

Corrective Actions:

MCR operators restored RPV pressure and level to their normal operating levels by 0941 hours using the turbine bypass valves to control pressure and the FLCS to control level. After discovery, the failed section of pipe was replaced. GP-18, "SCRAM/ATWS Event Review Procedure," was performed to verify all expected results of the reactor SCRAM and ensure the safety of a plant restart. Following completion of repairs to the pipe the unit was returned to operation on July 24, 1990.

Actions Taken to Prevent Recurrence:

Because the pipe failure was caused by vibration, an inspection of all six low pressure turbine bearing cavity drain pipes was conducted with no other failures identified. Pipe supports were added to all six. An evaluation by Nuclear Engineering and Services Department is ongoing to determine the need for any additional corrective actions for Unit 2 and any similar actions for Unit 1.

Previous Similar Occurrences:

Unit 1 LER 87-046 reported a reactor SCRAM from high power resulting from TCV fast closure caused by high water level in the moisture separator tank, and Unit 1 LER 87-048 reported a reactor SCRAM from high power caused by high Electro-Hydraulic Control system pressure. Unit 2 LER 89-013 reported a reactor SCRAM from high power due to TCV fast closure caused by a calculation error in the trip setpoint of a generator overcurrent relay. The corrective actions for these previous events

would not have prevented this event since the previous SCRAMs were due to different causes.

Tracking Codes: B6 - Application of design principles inadequate

ATTACHMENT 1 TO 9008160188 PAGE 1 OF 1

10 CFR 50.73

PHILADELPHIA ELECTRIC COMPANY

LIMERICK GENERATING STATION
P. O. BOX A
SANATOGA, PENNSYLVANIA 19464
(215) 327-1200 EXT. 2000

M. J. McCORMICK, JR., P.E. August 14, 1990
PLANT MANAGER
LIMERICK GENERATING STATION Docket No. 50-353
License No. NPF-85

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: Licensee Event Report
Limerick Generating Station - Unit 2

This LER reports a reactor SCRAM resulting from a Main Turbine Stop Valve closure (a Reactor Protection System actuation) caused by a low condenser vacuum trip of the Main Turbine. The low condenser vacuum was caused by a failed low pressure turbine bearing cavity waste oil drain pipe.

Reference: Docket No 50-353
Report Number: 2-90-012
Revision Number: 00
Event Date: July 15, 1990
Report Date: August 14, 1990
Facility: Limerick Generating Station
P. O. Box A, Sanatoga, PA 19464

This LER is being submitted pursuant to the requirements of 10 CFR 50.73(a)(2)(iv).

Very truly yours,

M. J. McCormick, Jr.

DCS:cah

cc: T. T. Martin, Administrator, Region I, USNRC
T. J. Kenny, USNRC Senior Resident Inspector, LGS

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